

In this protocol, it is assumed that the evaluation is being performed to obtain the P_D and P_{FA} at the leak rate specified in the EPA regulation for the type of system being evaluated, e.g., 0.1 gal/h for a line tightness test, 0.2 gal/h for a monthly monitoring test, and 3 gal/h for an hourly test. Thus, the procedure described below leads to the development of a noise CFD and a signal-plus-noise CFD for the leak rate of greatest regulatory interest for a line tightness test, a monthly monitoring test, and an hourly test. If local regulations specify leak rates more stringent than those in the EPA regulation, the local specification can be substituted for the EPA-specified leak rate.

Five options for developing the cumulative frequency distribution of the noise and the signal-plus-noise are described in the following sections. Each option is described in terms of procedure and data analysis. All require that the histograms be experimentally determined. The way to do this is to accumulate the results of tests that cover a wide range of temperature conditions.

6.3 EVALUATION PROCEDURE

The reader will recall, from Section 3.3, the general summary of the steps involved in the protocol. These steps are reiterated here, in a more specific way, as they apply to each of the five options. Step 2 of the protocol summarized in Section 3.3 presents the five options for collecting the data necessary to evaluate the performance of a pipeline leak detection system that measures and reports an output quantity. Since Step 2 is to choose one of the five options, which has obviously been done at this point, this step is omitted from procedures described below.

6.3.1 Option 1 - Collect Data at a Special Pipeline Test Facility

In Option 1, data are collected at special pipeline test facility. The histogram of the noise is generated from the results of actual tests with the leak detection system on a nonleaking pipeline over a wide range of environmental conditions. These conditions must include a wide range of product temperature changes. Option 1 is most easily implemented at a test facility like the EPA's UST Test Apparatus, where the integrity of the pipeline system is known and a range of environmental conditions can be generated and monitored quantitatively. The signal-plus-noise histogram for the EPA-specified leak rate can be compiled either directly from tests with the leak detection system over the same conditions used to generate the noise histogram or from the noise histogram and an experimentally validated relationship between the signal and the noise.

The test procedure will be applied to a pipeline system that meets the minimum specifications presented in Section 3.1. Below are the steps that should be followed to evaluate a leak detection system at a test facility. The steps correspond to those summarized in Section 3.3. Step 2, which is the selection of the evaluation option, has been omitted.